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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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09/987,914

11/16/2001

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HITA-0120

7936

7590

11/17/2003

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EXAMINER

BREWSTER, WILLIAM M

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 11/17/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application N .

09/987,914

Examiner

William M. Brewster

Applicant(s)

OSHIMA ET AL.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 and 28-42 is/are pending in the application.
- 4a) Of the above claim(s) 1-17 and 28-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 38-42 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 9, 10.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 38, 39, 41 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al., U.S. Patent No. 6,211,063 B1.

Liu anticipates a method of fabricating a semiconductor integrated circuit device, comprising: (a) in fig. 4, forming a lower layer dielectric film 36 including a first silicon oxide film containing fluorine, FSG over a major surface of a wafer 30, col. 4, lines 13-26;

limitations from claims 39 and 41: in figs. 4-6, wherein a stopper dielectric film 38 is formed between the inter-wiring layer portion and the inter-via layer portion, wherein the stopper film is a SiN film, col. 4, lines 46 - 57;

(b) forming an upper layer dielectric film 46 including a second silicon oxide film substantially without fluorine, HSQ as compared with the first silicon oxide film over the first oxide film, col. 4, lines 46-57, the upper and lower layer dielectric films constituting an inter layer dielectric film having an inter-wiring layer portion and an inter-via layer

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portion; (c) in fig. 8, forming a wiring groove and, in fig. 9, a via hole in the inter-layer dielectric film in such a manner that the wiring groove is formed through the second oxide film and the via hole is formed through the first oxide film, col. 5, line 18 - col. 6, line 10; (d) in fig. 11, filling the wiring groove and the via hole, with copper so as to form an embedded wiring and a copper plug electrically connecting the embedded wiring to lower wiring, col. 6, lines 30-34, wherein inherently, Young's modulus of the inter-via layer portion as a whole is smaller than that of the inter-wiring layer portion.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu as applied to claim 38 above, and further in view of Huang, U.S. Patent No. 6,177,364 B1.

Liu does not specify a stopper film of SiC, but Huang does. Huang teaches a method of fabricating a semiconductor device film, in fig. 1A, with forming a lower dielectric film 120, a stopper film 130 of SiC, col. 2, line 57 - col. 3, line 6, an upper dielectric film 140, in fig. 1B, an upper and lower layer dielectric films constituting an inter layer dielectric film having an inter-wiring layer portion 210 and an inter-via layer portion 230, col. 2, line 57- col. 3, line 50; forming a wiring groove and, a via hole in the inter-layer dielectric film in such a manner that the wiring groove is formed through the

second oxide film and the via hole is formed through the first oxide film, and in fig. 1D, filling with copper, col. 5, lines 31-50. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Huang's process with Liu's invention would have been beneficial because SiC gives a different etching rate, which may be of advantage with different ILD materials.

Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu as applied to claim 38 above, and further in view of Komada, U.S. Patent No. 6,627,554 B1.

Liu does not specify forming no stopper film between the inter-wiring layer portion and the inter-via layer portion, but Komada does. Komada teaches a method of fabricating a semiconductor device film, in fig. 3A, with forming a lower dielectric film 4B, an upper dielectric film 9, an upper and lower layer dielectric films constituting an inter layer dielectric film having an inter-wiring layer portion 12 and an inter-via layer portion; forming a wiring groove and, a via hole in the inter-layer dielectric film in such a manner that the wiring groove is formed through the second oxide film and the via hole is formed through the first oxide film, and filling with a conductive metal, col. 4, line 46 - col. 5, line 25. It would have been obvious to a person of ordinary skill in the art at the time the invention was made to recognize that combining Komada's process with Liu's invention would have been beneficial because eliminating the stopper reduces steps, and hence cost of producing the device.

Response to Arguments

Applicant's arguments with respect to claims 38-42 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

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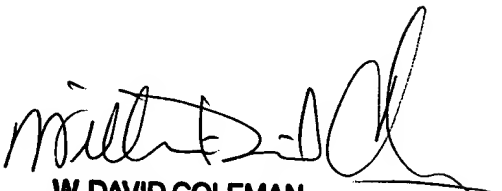
Any inquiry concerning this communication or earlier communications from the examiner should be directed to William M. Brewster whose telephone number is 703-305-5906. The examiner can normally be reached on Full Time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone number for the organization where this application or proceeding is assigned is 703-305-3432.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

WB

11 November 2003



W. DAVID COLEMAN
PRIMARY EXAMINER